REMARKS

Claims 1-18, 23 and 24 are currently pending. Applicant has amended claims 1-18 and 23-24. No claims are cancelled or are newly presented. No new matter has been introduced.

Claim Objections

Claims 2-18, 23-24 are objected to because of informalities. The claims have been amended to insert "point of care" before miniature in the preamble of each of these claims.

Rejections under 35 USC §103

Claims 1-2, 10-18 and 24 stand rejected under §103(a) as obvous over Zou, et al. 6,762,049, in view of Laugharn, et al. 6,719,449.

Claim 23 stands rejected under §103(a) as obvious over Zou, et al. in view of Laugharn, et al. and further in view of Austin, et al. 6,203,683.

Claims 6-9 stand rejected under §103(a) as obvious over Zou, et al. in view of Laugharn, et al. and further in view of Austin, et al. 6,203,683 and Miyazaki, et al. 5,599,502.

Claims 3-5 stand rejected under §103(a) as obvious over Zou, et al. in view of Laugharn, et al. and further in view of Austin, et al. 6,203,683 and Miyazaki, et al. 5,599,502 and Scott 5,594,751.

These grounds of rejection are respectively traversed.

In one embodiment of the present invention, as set forth in claim 1, a point of care miniature analytical device, with thermal regulation, includes a cartridge with one or more portions constructed of a material. The one or more portions define an array of temperature-controlled zones including reactants. Each temperature-controlled zone is constrained by cartridge portions that surround an area of space in which a reactant is contained and confine the reactant from flowing into the other temperature-controlled zones. The cartridge portions

include clear or translucent portions that allow direct irradiation of reactant molecules to facilitate thermal regulation of the reactants. An array of infrared radiation emitting heat sources are provided and is positioned to correspond to the array of temperature-controlled zones so that each heat source is arranged to provide temperature regulation to a corresponding temperature-controlled zone. One or more of the heat sources emit localized radiation to provide heating in the corresponding temperature-controlled zone. An optical temperature monitor, not in contact with the cartridge, is adjacent to a portion of the cartridge surrounding the temperature controlled zones. The optical temperature monitor monitors reactant temperature by measuring electromagnetic radiation. A controller and a power supply are configured to supply drive current to the infrared light source. A modulator is coupled to the controller to provide that current from the power supply achieves the desired thermal regulation in the temperature-controlled zones. A feedback loop provides measured temperatures to the controller, and modulates the power supply to drive the infrared light heat sources to achieve a desired temperature with a smooth control curve at the desired temperature.

Zou et al. discloses an apparatus for performing multiple, independently controlled, polymerase chain reactions. The apparatus includes a chip made of a low cost material. The chip contains an array of reaction chambers. After all of the reaction chambers have been filled with reagents, the chip is pressed against a substrate, such as a printed circuit board. A set of temperature balancing blocks are between the chip and the substrate. Individually controlled heaters and sensors are located between the blocks and the substrate and allow each chamber to follow its own individual thermal protocol while being thermally isolated from all other chambers and the substrate.

In Laugharn et al., a system is disclosed for exposing a sample to sonic energy to produce a desired result that can include, heating a sample, cooling the sample, fluidizing the sample, mixing the sample, stirring the sample, disrupting the sample, permeabilizing a component of the sample, enhancing a reaction in the sample, and sterilizing the sample. A feedback loop regulates sonic energy location, pulse pattern, pulse intensity or absorbed dose of the ultrasound energy. The feedback loop can include one or more sensors that sense, sample temperatures, sonic beam intensity,

pressure, bath properties including temperature salinity, and polarity, sample position, and optical or visual properties of the samples. These optical properties can include apparent color, emission, absorption, fluorescence, phosphorescence, scattering, particle size, laser/Doppler fluid and particle velocities, and effective viscosity. Sample integrity or communication can be sensed with a pattern analysis of an optical signal. Any sensed property, or combination thereof, can serve as input into a control system. The feedback can be used to control any output of the system, for example beam properties, sample position, and treatment duration.

Austin et al. discloses a device, chip, for the integrated micromanipulation, amplification, and analysis of polyelectrolytes such as DNA. The microchip contains electrodes for dielectrophoresis powered by an alternating current signal generator, and a trapping electrode attached to a current source that can be heated to specific temperatures. Nucleic acids can be heated and cooled to allow for denaturation, and the annealing of complementary primers and enzymatic reactions, as in a thermocycling reaction. After a reaction has been completed on the trapping electrode, the dielectrophoretic field can be switched to a direct field to release the product and direct it through a matrix for fractionation. Data analysis equipment is included for the control of these operations, and imaging equipment for the analysis of the products.

Miyazaki, et al. discloses an apparatus for measuring biological materials that includes a liquid container for housing a liquid containing biological materials with a flow path having a measuring portion at which the biological materials within the flow path are measured, and an outlet downstream of the measuring portion. A heater constantly applies heating energy to the liquid exposed outside of the outlet of the flow path to constantly evaporate the exposed liquid and to generate smooth flow along the flow path. A detector measures the biological materials in the liquid at the measuring portion in the flow path. The heating can be achieved by resistance heating, arc heating, induction heating, dielectric heating, application of electromagnetic wave, light heating conversion and infrared heating.

Scott et al. discloses a VCSEL laser.

None of the cited references, singularly or in combination, disclose an optical temperature monitor that monitors reactant temperature by measuring electromagnetic radiation, a controller and power supply that supply drive current to an infrared light source, a modulator coupled to the controller to provide that current from the power supply achieves a desired thermal regulation in temperature-controlled zones, a feedback loop that provides measured temperatures to the controller, and modulates the power supply to drive the infrared light heat sources to achieve a desired temperature with a smooth control curve at the desired temperature.

CONCLUSION

It is submitted that the present application is in condition for allowance, and such action is respectfully requested.

The Commissioner is authorized to charge any additional fees which may be required, including petition fees and extension of time fees, to Deposit Account No. 08-1641 (Docket No. 38187-2855).

Respectfully submitted,

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